

adding silicon, thereby increasing the fluidity and reducing the tendency to form blow-holes; he also gave reasons why increased permeability might be expected from this, as the addition of silicon probably acts by reducing the combined carbon in the iron, leaving the pure iron with a sponge or network structural formation calculated to give great freedom for molecular movement.

On the subject of coil winding, he showed by diagrams that at present the space occupied by insulation may be reduced by winding the copper upon the coils in the form of thin strip on edge, and insulating the portions from one another by a paint or varnish of sufficient dielectric strength, high heat conductivity, and power of retaining its dielectric strength at temperatures of 200° C. The thinness and fragility of the copper strip, however, demand that this should be done by a machine which will roll the copper to the section and curvature just as it is ready to be wound on. The difficulty was alluded to of designing the cores and windings of high-speed turbo-generators, owing to the trouble of resisting mechanical stresses due to centrifugal forces, and at the same time of subdividing them sufficiently to prevent the formation of eddy currents.

It was pointed out that although recently the developments of electrical storage have not been much discussed, it would be better to go on improving the lead couple accumulator we now have instead of waiting for the invention of some new storage couple which we may never obtain. The combination of the internal combustion engine driving a generator and worked by suction gas plant for long hours, thereby charging a battery of accumulators, is, if combined with a small steam plant capable of taking the peak load, probably the most economical method of producing energy for the short hours of lighting. Portable storage is much required for the modern automobile, and some progress has been made, but much still remains to be done. The lecturer did not believe that much could be gained from Edison's newly invented couple.

The utilisation of single phase alternating currents for railways is already within reach, the choice of systems lying between the Finzi type of series motors and the Winter and Eichsberg compensated repulsion motors. Electric traction can supersede existing steam haulage for passenger work at the present schedule speeds with economy and advantage. It is not quite certain that electric haulage will supersede steam haulage for high-speed passenger work, as, although undoubtedly electric haulage can work trains at 100 miles an hour, the steam locomotive can be improved to work at the same speed with equal safety. Engineers will not attack the long distance haulage of goods for years to come, at least not in our present state of knowledge of the cost of generating electrical energy. The successful development by electrical means of change speed and torque gear is much needed by the mechanical engineer, not only for railway work, but for rolling mills and similar purposes.

The measuring instruments used by electrical engineers have made great strides towards perfection, but there are some problems still unsolved, notably the power measurements of alternating currents.

Although there have been recently many attempts to improve the efficiency of electric lamps, both of the arc and incandescent type, yet much remains to be done. By using a beam of violet-blue light of considerable intensity it is nearly certain that many substances hitherto considered opaque, but which owe their opacity to the diffused refraction of the red and yellow rays, will be rendered transparent.

A problem of great importance will be the discovery of a direct method of producing cold by electric means, as by such methods cold storage will be facilitated in the larders of private houses.

Electric smelting has made great advances, and although it presents many unsolved problems, much may be hoped for in this direction.

The problem which is of the greatest interest to the world in general is the satisfactory development of power schemes by which the population can be sent back to the land. The solution is more difficult in this country, where we have no power supply from natural water power, but progress may nevertheless be expected.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

At the graduation ceremony of Glasgow University on Tuesday, the degree of Doctor of Laws was conferred upon Prof. A. Crum Brown, F.R.S.

It is announced by *Science* that gifts of 20,000*l.* to Rochester University for the construction of a scientific building, and of 10,000*l.* to Norwich University, Vermont, half for a library and half for an engineering department, have been announced. A donation of 50,000*l.* has been made to Northwestern University by Mr. Milton H. Wilson, a resident of Evanston, and one of the trustees of the institution.

REPLYING to a discussion on university education in Ireland which was raised on the Civil Service Estimates in the House of Commons on April 13, Mr. Balfour gave it as his opinion that Ireland is not provided for adequately in respect of university education. The decline in the number of students in Trinity College he ascribes to the great revolutions in the system of land tenure, which have diminished substantially the resources and the numbers of the class that send students to that institution. There is also a diminution of attendance at the Queen's College, Belfast, which is largely due to the influence which the Royal University is exercising on education in its higher forms by substituting a mere system of examination for a university training. Another reason for the falling off at the Queen's College is that the institution is without the funds necessary for complete equipment.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 16.—"On the Absence or Marked Diminution of Free Hydrochloric Acid in the Gastric Contents in Malignant Disease of Organs other than the Stomach." By Prof. Benjamin **Moore**, in collaboration with Dr. W. **Alexander**, Mr. R. E. **Kelly**, and Mr. H. E. **Roaf**.

It has long been known that free hydrochloric acid is absent or reduced in amount in the great majority of cases of cancer of the stomach.

The absence of the acid in such cases has been attributed to local action, to continued irritation of the mucous membrane of the stomach by the presence of the growth, to retention of the food in the stomach acting as an irritant and causing gastritis when the growth has narrowed the pyloric opening, or to alkaline products thrown out at the seat of the growth and neutralising the acid.

The facts that the acid is not nearly so frequently absent in gastritis due to causes other than cancer of the stomach, and that the acid may be absent in cases of cancer and where there is no marked gastritis, and where the growth is confined to a small part of the mucous membrane, the remainder being normal, led to the surmise that the absence of free hydrochloric acid in the gastric secretion might not be due to local conditions in the stomach, but to a general condition of the blood which rendered it difficult or impossible for the oxyntic cells of the cardiac glands to secrete the acid.

To test this view, the amount of free hydrochloric acid in the gastric contents was determined in *seventeen* cases of malignant disease in which the growths were situated in regions remote from the stomach, such as tongue, cheek, floor of mouth, rectum, prostate, breast, and uterus.

As a result of the determinations it was found that free hydrochloric acid was either entirely absent (two-thirds of the cases) or greatly reduced in quantity. This shows that the absence of free hydrochloric acid in cancer of the stomach is not due to local action in that organ, but, on the other hand, that cancer, *wherever occurring*, is associated with diminution or absence of the acid from the gastric secretion.

Such a result can only arise by an alteration in the blood, which increases the difficulty of separating free hydrochloric acid by the secreting cells.

It is pointed out in the paper that the most probable alteration in the blood plasma increasing the difficulty of

secretion of hydrochloric acid by the gastric glands is a decrease in the concentration of the hydrogen ions.

Blood plasma is alkaline to some indicators and acid to others, indicating the presence of both hydroxyl ions, upon which its alkalinity depends, and hydrogen ions, giving an acid reaction. Any agency which increases the effective alkalinity of the blood, that is to say, which increases the hydroxyl ions and diminishes the hydrogen ions, will increase the difficulty of separating a secretion containing free hydrochloric acid.

In cases where the gastric secretion has its acidity diminished or reduced to zero, as is found to be the case in carcinoma, it is hence highly probable that the concentration of the hydrogen ions in blood plasma is reduced. The action of the kidney cells in maintaining a definite degree of alkalinity of the plasma is hence altered, so that a greater degree of alkalinity is maintained than in the normal individual.

It has been shown by Loeb that slight increase in alkalinity of the medium leads in certain instances to a more rapid cell division and growth, and if this holds good generally, it is possible that increased alkalinity of the blood plasma may lead to increased activity in cell division, and hence be a stimulating cause leading to formation of new growths.

The acidity was determined by the following methods:—

(a) *Total acidity* by titration with phenolphthalein as indicator. This lay very low in the seventeen cancer cases, being normal in one case only, above 0.1 per cent. in four cases, and in the majority one or two drops of decinormal alkali sufficed to render neutral.

(b) *Günzberg's reagent for free hydrochloric acid* gave entire absence in eleven out of seventeen cases, a minute trace in five cases (0.0036 per cent. to 0.0109 per cent.), and 0.0365 per cent. was the highest value attained in a single case only.

(c) *Hydrolysis of methyl acetate by the filtered gastric contents* for the determination of the concentration of free hydrogen ions was carried out in ten cases, and it was found that the concentration in all these never exceeded one-fifteenth of the average concentration in three normal cases tested by the same method.

March 30.—“Note on Fluorescence and Absorption.” By J. B. **Burke**. Communicated by Prof. Larmor, Sec.R.S.

In a paper “On the Change of Absorption produced by Fluorescence”¹ the author gave an account of the experiments by which he found the existence of a very remarkable difference in the absorption of the fluorescent light of uranium glass when in the luminous and non-luminous states. This difference he has attributed² to a temporary change in structure or chemical composition of the body when exposed to the influence of the exciting light, and he has been led to regard this as due to new atomic connections giving rise to new frequencies during the period of luminosity, by the formation of unstable aggregates, which radiate intensely, as they disintegrate, the energy which was stored up in their formation; the luminosity being thus the visible manifestation of a process of building up and breaking down of molecules.

Messrs. Nichols and Merritt have found recently³ that the change of absorption depends upon the intensity of the fluorescence, and that a saturation effect takes place in the absorption as the intensity of the luminosity increases, attaining a maximum with a certain intensity of the fluorescent light. They used, not the fluorescent light from another similarly excited body, but an acetylene flame as the source of the transmitted rays.

M. Camichel has encountered some difficulty in detecting the change with the light from a flame, and this appears to have been due to the use of a screen of uranium glass, 7 cm. in thickness, to cut off the more refrangible rays from the flame, a precaution which is by no means necessary, since the effect has been observed without it. The fluorescence caused by the flame merely diminishes the apparent absorption. The screen, on the other hand, must itself fluoresce, and in so doing—if the

effect sought for occurs—absorb to a considerable extent the rays the absorption of which it is proposed to measure on the assumption that they are transmitted by the screen.

For fluorescence of very feeble intensity the effect may not in any circumstances be perceptible.

Furthermore, the fluorescent spectrum of uranium glass is composed of several bands, and these in turn the author regards as discontinuous, and made up of more finely divided bands or lines.

Thus the use of the screen filters the rays, and only those which are not absorbed by uranium glass are transmitted. These would not undergo any change of absorption.

The change of absorption cannot be due to the increased amplitude if the vibrations are linear, but where new free periods are produced by the exciting rays, the intensity and the absorption of the fluorescent light would both depend upon the number and duration of the periods thus produced, and it is this which the change of absorption in fluorescence most distinctly proves.

“The Direct Synthesis of Ammonia.” By Dr. E. P. **Perman**. Communicated by Principal E. H. Griffiths, F.R.S.

(1) So far as can be shown by one of the most delicate tests known to chemists, ammonia cannot be synthesised by heat (except under special conditions specified below). The decomposition of ammonia by heat may, therefore, be regarded as an irreversible reaction. (2) Ammonia may be synthesised in small quantities from its constituent elements (a) by heating with many of the metals; (b) by exploding with oxygen; (c) by sparking. These are reversible reactions. (3) It would appear that the synthesis of ammonia is effected only when the gases are ionised; the ionisation would be brought about by sparking, or by the high temperature of an explosion of hydrogen and oxygen. The immediate decomposition of the ammonia formed would be prevented by its sudden cooling. The metals in the presence of moisture also produce “nascent” or ionised hydrogen. (4) It does not appear that nitrides of the metals form an intermediate stage in the formation of ammonia, for it was found that metals readily forming nitrides, e.g. magnesium, did not produce more ammonia than the others. (5) There is a close analogy between ozone and ammonia with regard to their synthesis and decomposition; both are formed by sparking, and both are completely decomposed by heat.

“Determination of Vapour-pressure by Air-bubbling.” By Dr. E. P. **Perman** and J. H. **Davies**. Communicated by Principal E. H. Griffiths, F.R.S.

It was shown recently by one of the authors that the vapour-pressure of water can be determined with a considerable degree of accuracy by bubbling a current of air through water in a thermostat, and estimating the amount of water evaporated by absorbing it in strong sulphuric acid.

The accuracy of the method has since been questioned, supersaturation being specially suggested as likely to cause error. Experiments have therefore been made in order to discover what error (if any) is introduced by supersaturating the air with moisture before it enters the water in the thermostat. The effect of dust in the air and of electrification have also been investigated. In each case the arrangement of the apparatus was as described in the previous paper.

Supersaturation.—Before passing into the flasks in the thermostat, which was maintained at 70°, the air was bubbled through a large wash-bottle containing water at about 85°.

Dust in the Air.—A thick smoke was made by burning pieces of phosphorus near the inlet tube of the apparatus described in the former paper.

Electrification of the Air.—(1) The air was made to pass through a large flask in which hydrogen was being rapidly evolved from zinc and dilute sulphuric acid.

(2) One terminal of an induction-coil, capable of giving (with the battery power used) a 6-inch spark, was connected with a wire passing into the first (nearest the inlet) flask in the thermostat; the other terminal was connected with the bath, so that the silent discharge passed through the flasks and the air inside.

¹ *Philosophical Transactions*, (A) 1898; *NATURE*, July 15, 1897.

² *British Assoc. Report*, Belfast, 1902, and *Phil. Mag.*, 1901.

³ *Physical Review*, December, 1902.

(3) The X-rays from an ordinary focus-tube were allowed to fall on the flasks in the thermostat, and were specially directed on to the last (nearest outlet). A wire from one of the terminals of a Wimshurst machine was passed down the gauge-tube into the last flask, the other terminal being connected with the bath.

The last mentioned experiments gave vapour-pressures 237.5 and 238.0, instead of the normal value 234.0.

The greatest deviation from the normal value obtained in the other experiments was slightly more than 0.5 per cent., which is almost exactly the same as that obtained in the original investigation.

It may safely be concluded, therefore, that no naturally occurring supersaturation, or dust, or electrification of the air would have any appreciable effect on the result.

April 6.—“On Endophytic Adaptation shown by *Erysiphe Graminis* DC. under Cultural Conditions.” By E. S. **Salmon**. Communicated by Prof. H. Marshall Ward, F.R.S.

In recent papers by the author the fact has been pointed out that certain species of the Erysiphaceæ are able, under cultural conditions, to infect their host-plants vigorously when their conidia or ascospores are sown on the cells of the internal tissues exposed by means of a wound, although the fungi in question are confined normally to the external surface of the epidermal cells.

The author, reviewing the results of the present investigations, points out that they afford proof that *E. graminis* is not, as perhaps might have been expected, so highly specialised as an ectoparasite as to be necessarily restricted for its food-supply to cells of the epidermis, but shows itself capable of immediate adaptation to conditions closely resembling those obtaining in endophytism.

This fact suggests the possibility that in some circumstances the mycelial hyphæ of species of the Erysiphaceæ which are normally ectoparasites may penetrate into the internal tissues of their host-plants exposed through wounds caused in nature by the attacks of animals or by physical agency. It is pointed out, however, that the successful entry of the hyphæ might be prevented, either by the drying up of the superficial layers of cells, or by the healing processes shown by many actively growing leaves.

“On the Physical Chemistry of the Toxin-Antitoxin Reaction: with Special Reference to the Neutralisation of Lysin by Antilysin.” By J. A. **Craw**. Communicated by Dr. C. J. Martin, F.R.S.

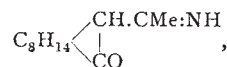
Summary of Conclusions.—(1) Megatherium lysin passed through a gelatin filter, and is diffusible through gelatin. (2) Megatherium antilysin does not pass through a gelatin filter, and is not appreciably diffusible through gelatin. (3) The filtration and diffusion of mixtures show that free lysin is present in neutral mixtures and in mixtures containing excess of antilysin. (4) Free antilysin exists in neutral mixtures, and in mixtures containing excess of lysin. (5) The reaction is at least partially reversible when excess of antilysin is present. (6) False equilibria are produced with greater facility when the lysin is in excess. (7) The neutralisation equation of Arrhenius and Madsen does not hold for multiple mixtures. (8) The removal of lysin from a solution by antilysin is not capable of interpretation as a purely chemical change, but is more analogous to certain adsorption phenomena.

Faraday Society, April 4.—Prof. A. K. Huntington in the chair.—Alloys of copper and bismuth: A. H. **Hiorns**. Results of a further research on copper alloys carried out in a similar manner to that on the copper-arsenic series published in the *Transactions* of the society, April, 1904. Prof. Arnold has investigated the effect of bismuth, from 0.1 per cent. to 0.5 per cent., on copper, and found that the investing membranes surrounding the grains of copper appeared to be split down the centre, presenting a definite plane of cleavage. Dr. Gautier obtained a freezing-point curve similar to the author's, but his temperatures are generally higher. The microscopic evidence mainly confirms the records of the freezing-point curves, of which there are four branches.—Refractory materials for furnace linings: E. Kilburn **Scott**. (Discussion.)—Electrically heated carbon tube furnaces, part i.: R. S. **Hutton** and W. H. **Patterson**. This type of furnace seems to be the

most readily available for the very highest temperatures, and the authors have been able to get satisfactory results with a very simple type of construction. The important points to bear in mind are the end connections (which must be kept cool), protection of the tube from contact with air, and heat insulation. Two types of furnace are described:—(1) graphite tube furnace; (2) agglomerated carbon tube furnaces.

Anthropological Institute, April 4.—Prof. W. Gowland, president, in the chair.—The fort and stone-lined pits at Inyanga contrasted with the Great Zimbabwe: R. N. **Hall**. The walls of the fort are built upon a curved plan, and the fort itself is divided into enclosures for purposes of defence. The fort has twenty-five entrances pierced through the walls which are themselves pierced with a great number of loopholes. The fort is also peculiar for the employment of banquette walls, which are not met with except in a few ruins in southern Rhodesia. Another peculiarity of the building is the absence of buttresses. The stone-lined pits are very numerous throughout Inyanga, and are usually found in clusters of twos and threes. Mr. Hall was of opinion that they were not used as slave-pits, as had been supposed, but as shelters from the variable temperature. The pits consist of a hole lined with masonry, and a curved, paved passage used as an entrance. In almost every case the pits have a drain running through the rampart, and another peculiarity is the erection near them of a stone monolith. Mr. Hall also referred to the hill terraces found in the neighbourhood, and in conclusion contrasted the architecture of the fort and pits with the temple and acropolis at Zimbabwe.

Chemical Society, April 6.—Prof. R. Meldola, F.R.S., president, in the chair.—The kinetics of chemical changes which are reversible. The decomposition of *as*-dimethylcarbamide: C. E. **Fawcitt**. This investigation is a continuation of those already published on carbamide and methylcarbamide, and the same explanation of the decomposition holds good.—A new formation of acetylcamphor: M. O. **Forster** and Miss H. M. **Judd**. The imine



obtained by the action of magnesium methyl iodide on α -cyanocamphor, is resolved quantitatively by acids into acetylcamphor and ammonia.—Preparation and properties of 1:4:5-trimethylglyoxaline: H. A. D. **Jowett**. This base was prepared in the course of an attempt to obtain substances having a constitution analogous to that of pilocarpine. The base and a number of its salts are described.—Bromomethyl heptyl ketone: H. A. D. **Jowett**. This bromoketone is obtained by the action of bromine in chloroform solution on methyl heptyl ketone obtained from oil of rue.—Limonene nitrosocyanides and their derivatives: F. P. **Leach**. The α -nitrosocyanide crystallises in prisms whilst the β -compound forms fine woolly needles. These isomerides are regarded as having the *cis* and *trans* configurations, since on hydrolysis both give rise to the normal oxime of dihydrocarvone.—The action of carbon monoxide on ammonia: H. **Jackson** and D. **Northall-Laurie**. The authors find that the main reaction is the formation of ammonium cyanate, which rapidly changes to carbamide.—The action of acetylene on aqueous and hydrochloric acid solutions of mercuric chloride: J. S. S. **Brame**. The first action of acetylene on mercuric chloride is shown to be one of simple combination, the product being then decomposed by water forming aldehyde and the substance $\text{C}(\text{HgCl})_3\text{CHO}$.—The basic properties of oxygen at low temperatures. Additive compounds of the halogens with organic substances containing oxygen: D. **McIntosh**. Crystalline compounds of chlorine and bromine with methyl and ethyl alcohols, methyl ether, acetone, ethyl acetate, acetaldehyde, and acetic acid have been obtained.—Note on the interaction of metallic cyanides and organic halides: N. V. **Sidgwick**. A possible explanation of the formation of both nitriles and isocyanides in this reaction from the same initial additive compound is given.—The chemical dynamics of the reactions between sodium thio-sulphate and organic halogen compounds, part ii., halogen substituted acetates: A. **Slator**. The reactions of the

thiosulphate with ethyl iodoacetate and methyl, ethyl and sodium bromo- and chloro-acetates have been investigated, and shown in all cases to be bimolecular reactions.—The tautomerism of acetyl thiocyanate: A. E. **Dixon** and J. **Hawthorne**.—A method of determining the specific gravity of soluble salts by displacement in their own mother liquor, and its application in the case of the alkali halides: J. Y. **Buchanan**.—The combination of mercaptans with unsaturated ketonic compounds: S. **Ruhemann**.—The existence of a carbide of magnesium: J. T. **Nance**. The yellow residue formed when magnesium is heated with carbon evolves hydrogen and acetylene when dissolved in acids, and may contain a carbide.—Isomeric salts of the type NR_2H_2 . A correction. Isomeric forms of *d*-bromo- and *d*-chloro-camphorsulphonic acids: F. S. **Kipping**. The further study of the isomeric α and β salts has shown that the isomerism of these compounds is not due to difference in the spatial arrangement of the groups attached to the quinquivalent nitrogen atom, but to the existence of *cis* and *trans* forms of *d*-bromo- and *d*-chloro-camphorsulphonic acids.—Isomerism of α -bromo- and α -chloro-camphor: F. S. **Kipping**.—*l*-Phenylethylamine: F. S. **Kipping** and A. E. **Hunter**.—The influence of the hydroxyl and alkoxyl groups on the velocity of saponification, part i.: A. **Findlay** and W. E. S. **Turner**. The numbers obtained show that the hydroxyl group exercises an accelerating influence on the velocity of saponification, but that on replacing the hydrogen of the hydroxyl by an alkyl group the rate diminishes, and the effect increases regularly with the mass of the alkyl group.

Linnean Society, April 6.—Mr. A. C. Seward, F.R.S., vice-president, in the chair.—Specimens and drawings of pitchers of *Nepenthes*, supplemented by slides, prepared by Mr. L. Farman, to illustrate the various types of pitchers and their marvellous glandular systems: W. Botting **Hemsley**, F.R.S. Mr. Hemsley first exhibited a new species, *Nepenthes Macfarlanei*, which differs from all other known species, except *N. Lowii*, in the underside of the lip being thickly beset with stiff bristles, interspersed with honey-glands. Other species were compared with *N. Macfarlanei*. Briefly, all the complex arrangements of these plants favour the descent of insects and other creatures into the pitchers, and hinder almost all visitors from getting out again; once in, there is little hope of escape. A few hybrids were also shown, notably one named "Sir William Thiselton-Dyer," which has produced the largest pitcher known in cultivation, being a pint and three-quarters in capacity.—The axillary scales of aquatic Monocotyledons: Prof. R. J. Harvey **Gibson**. The author compared the ligule of *Selaginella* with the scales in question, and suggested that the latter may be looked upon as evidence that the Monocotyledons may be regarded as modern representatives of primitive Angiosperms, and in turn may have been genetically related to some ancestral form allied to Isoetes.—A further contribution to the study of *Pelomyxa palustris* (Greeff): Mrs. L. J. **Veley**. After alluding to her previous memoir in the *Quarterly Journal of Microscopical Science*, n. ser. xxxvi. (1894), pp. 295–306, the author explained that the "rods" present in *Pelomyxa palustris* (Greeff) are symbiotic bacteria (*Cladothrix pelomyxae*, Veley); they complete their development within the animal and are then ejected, breaking down into free "swarmers," which are ingested by other *Pelomyxae*, and immediately re-commence the cycle. The "refringent bodies" are proteid in nature, viz. some form of albumin which is a waste product of the metabolism of *Pelomyxa*. They supply the bacteria with a point of attachment necessary for development, and (probably) also with nourishment.—*Mansonieae*, a new tribe of the natural order Sterculiaceae: Dr. D. **Prain**.

PARIS.

Academy of Sciences, April 10.—M. Troost in the chair.—Remarks on the recognition of the solar corona at times other than during total eclipses: H. **Deslandres**. A criticism of the results recently obtained by Hansky, in which the difficulties introduced by diffused light in the apparatus do not appear to have been sufficiently taken into account. The use of a simple concave mirror, as employed by Huggins in 1883, is decidedly preferable to

the system of two lenses and a mirror used by Hansky. Details are given of the method suggested by the author.—The conclusions to be drawn from the study of homogeneous enclosures in petrography: A. **Lacroix**.—The plants of the plateau of the Nilghirris: Gaston **Bonnier**. The mean temperature of Ootacamund is practically the same as that of Paris, and a detailed comparison of the flora of the two places is given. The altitude of the Nilghirris is not sufficient for the plants to acquire all the characteristics of alpine plants, but they acquire certain alpine characters. There are also special modifications induced by the large difference between the day and night temperature.—On the Peneideae and Stenopideae collected by the French and Monaco expeditions in the eastern Atlantic: E. L. **Bouvier**.—The conflict between the primary and accidental images, applied to the theory of inevitable variability of retinal impressions excited by objects illuminated by sources of light of constant value: A. **Chauveau**. The impression produced on the retina by a geometrical figure is complex, and is a resultant formed by the superposition of two images, the one objective, the other subjective, and an experiment is described showing how these may be separated. The effects of colour, intensity of illumination, motion of the retina, displacement of the eye or the object, and accommodation are considered systematically. The case of the *n*-rays is not actually taken by the author, but the considerations here put forward clearly suffice to explain many of the phenomena ascribed to the action of these rays.—The heat of formation of sodium hydride. The acidity of the molecule of hydrogen: M. **de Forcrand**.—On the reduction of oxyhæmoglobin: R. **Lepine** and M. **Boulud**. The oxyhæmoglobin is reduced with a titrated solution of ferrous sulphate, and the time of reduction noted, the colouring matter being considered as reduced when the two absorption bands fuse together. In normal blood from the dog the time of reduction is fixed, and is between eighteen and twenty minutes, and this time is independent of the dilution. In anæmia, with a quantity of the reducing agent proportional to the amount of hæmoglobin, the time of reduction is much increased. Prolonged inhalation of ether or chloroform also increases the time of reduction. Human blood from anæmic patients shows the same characteristics.—On *Rhabdocarpus*, the seeds and the evolution of the Cordaiteae: M. **Grand'Eury**.—Report presented in the name of the committee charged with the scientific control of the geodesic operations at the equator. The operations have been much delayed by the unfavourable meteorological conditions and by the illness of several members of the expedition. A short account is given of the progress made in triangulation, levelling, and pendulum observations. An astronomical station has been installed at Cuenca, and another will be set up near the fourth parallel. On account of the limited financial resources of the expedition, it is proposed that a portion of the original scheme be dropped.—Observations of the Giacobini comet (1905 a) made at the Observatory of Algiers with the 31.8 cm. bent equatorial: MM. **Rambaud** and **Sy**. The observations were made on March 28, 29, and 30, and give the apparent positions of the comet with the positions of comparison stars. On March 28, when the atmospheric conditions were exceptionally favourable, a nucleus could be clearly made out of about the thirteenth magnitude.—Actinometric observations at the summit of Mont Blanc in 1904: A. **Hansky**. The weather conditions were not favourable. The most probable value of the solar constant from the 1904 observations is 3.28 calories.—On integral functions: Eugène **Fabry**.—On Monge's problem: P. **Zervos**.—On the equilibrium of arches in circular arcs: M. **Belzecki**.—On the longitudinal stability of aërostats: L. **Torres**. A discussion of a paper on the same subject by M. Renard, in which, as the result of a theoretical investigation, certain modifications of the stern are suggested. In the present paper it is shown that this investigation is not strictly correct, and that the modifications suggested will not have the desired effect.—On the diamagnetism of bismuth: A. **Leduc**. Bismuth was fused in small spherical flasks and allowed to solidify in a strong magnetic field (4000 to 5000 C.G.S. units). The sphere of solid bismuth, suspended in the same field, took up the same position as it

had at the moment of solidification.—Contribution to the study of ionisation in flames: Pierre **Massoulier**. The conductivity of an ether flame is considerable. By introducing increasing proportions of carbon dioxide into this flame, although the temperature is lowered, the ionisation, as measured by the current between two electrodes in the flame, is increased. The results are interpreted by the author as being due to the dissociation of the carbon dioxide in the flame.—On the variation of the difference of contact potential for miscible solutions of electrolytes: M. **Chanoz**.—On the dichroism produced by radium in colourless quartz and on a thermoelectric phenomenon observed in striated smoky quartz: N. **Egoroff**. Colourless quartz, exposed to the action of radium for a week, exhibited dichroism identical with that ordinarily observed with smoky quartz. A plate of smoky quartz, heated to 100° C. and treated with a mixture of sulphur and red lead, gave a figure reproducing the striations.—An automatic damping arrangement applicable to pendular and oscillatory movements: V. **Crémieu**.—On a photograph of a lightning flash showing the air in incandescence: Em. **Touquet**. The persistent glow which is visible in some cases after a lightning flash is due to the incandescence of the air. This effect is not physiological, as it is clearly shown in some photographs taken by the author and by other experimenters.—The etherification of glycerin: Marcel P. S. **Guédras**.—The liquefaction of allene and allylene: MM. **Lespieau** and **Chavanne**. The two gases were prepared with great care in a pure state and solidified in liquid air. Allene melts at -146° C., boiling at -32° C., its critical point being about 121° C. Allylene melts at -110° C., boils at -23.5° C., and has a critical point of 120.5° C., the temperatures being all measured by an iron-constantan thermo-couple. The purity of the gases was determined by a combustion analysis.—On the hydrogenation of benzonitrile and paratoluonitrile: A. **Frebault**. **Sabatier** and **Senderens**, who have already applied their reaction to this case, found that nickel carried the reduction too far, toluene and ammonia being the only products, and were obliged to replace the nickel by copper to obtain benzylamines. Working under somewhat different conditions, the author has obtained results with nickel.—Secondary diazoamines: Léo **Vignon** and A. **Simonet**.—On the hydrates of acetol: André **Kling**.—On the use of the metal ammoniums in chemistry: the preparation of paraffins: Paul **Lebeau** (see p. 592).—On isodimorphism: Fred. **Wallerant**.—On a new indiarubber *Euphorbia*: Henri **Jumelle**. This tree grows in the north-west of Madagascar, and its indiarubber producing properties were discovered accidentally by the natives. It appears to be a new species, and is named *Euphorbia elastica*.—The action of ether and chloroform on dried seeds: Paul **Becquerel**. The result is due to action of these substances on the fatty material of the cell, but the effect of the chloroform is much more energetic.—On the formation and function of fatty materials in fungi: A. **Perrier**. It is shown that the fat acts as a reserve food material for the plant.—On some points of anatomy of the male organs of the Edentata, and on their means of fixation: Rémy **Perrier**. It is shown that this is not a case of retrogression, but that the condition of the male organs corresponds to a primitive form. This view confirms the palæontological results as to the age of the Edentata.—The weight of the brain as a function of the body weight in birds: L. **Lapicque** and P. **Girard**. The exponential formula given by Dubois for expressing the weight of the brain as a function of the body weight holds for the case of birds, the index having the same numerical value as in mammals (0.56).—On the alternation of eclipses and the lustre of feebly lighted objects: Th. **Lullin**.—The spectroscopy of the blood and of oxyhæmoglobin: M. **Piettre** and A. **Vila**. The reaction of sodium fluoride upon the absorption spectrum of blood is a very delicate one, and can be used to detect traces of fluorides down to 5 parts in a million. A diagram is given of the relation between the intensity of the absorption bands of oxyhæmoglobin and the dilution.—On the normal presence of alcohol and acetone in the liquids and tissues of the organism: F. **Maignon**.—Researches on hæmatogen: MM. **Hugounenq** and **Morel**.—The influence of the state of liquefaction of starch on its transformation by diastases: A. **Fernbach**

and J. **Wolff**.—Experimental acid dyscrasia: M. **Charrin**.—On the age of the granite of the western Alps and the origin of the crystalline exotic blocks of Klippes: C. G. S. **Sandberg**.—On the Lahore earthquake and the variations of the magnetic needle at Paris: Th. **Moureaux**. Disturbances of the magnetic records at Paris were observed on the day of the Lahore earthquake.

GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (physico-mathematical section), part vi. for 1904, contains the following memoirs communicated to the society:—

October 29.—W. **Voigt**: Remarks on tensor-analysis. A. **Schoenflies**: On the geometrical invariants of the analysis of position. Eduard **Riecke**: Researches on the phenomena of discharge in Geissler tubes. F. **Bernstein**: On the theory of aggregates.

December 17.—G. **Herglotz**: On the calculation of retarded potentials.

DIARY OF SOCIETIES.

THURSDAY, APRIL 27.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Discussion: Mr. B. J. Arnold's Address to the Joint Meeting at St. Louis on the Problem of the Alternate Current Motor applied to Traction.—Paper: The Alternate Current Series Motor: F. Creed.

FRIDAY, APRIL 28.

EPIDEMIOLOGICAL SOCIETY, at 8.30.

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